

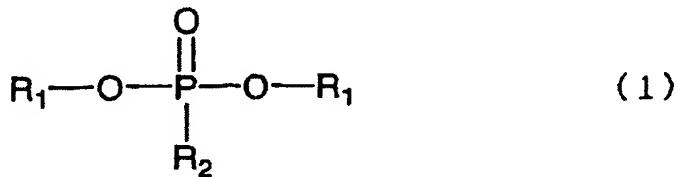
CLAIMS

1. A phosphorus-containing urethane (meth)acrylate compound obtained by reacting (A) a polyol compound comprising (A1) a phosphorus-containing polyol having a phosphorus atom, with (B) a bifunctional or greater polyisocyanate and (C) a hydroxyl group-containing (meth)acrylate.

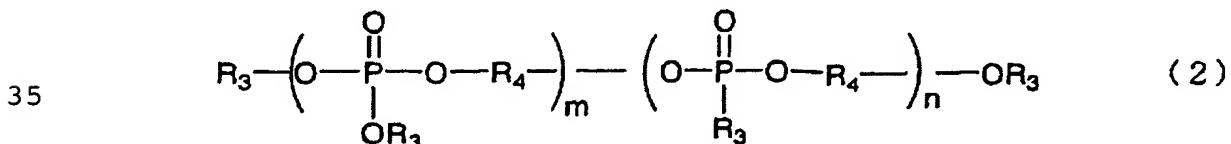
5 2. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, characterized in that the polyol compound (A) is the phosphorus-containing polyol having a phosphorus atom (A1).

10 3. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, characterized in that the polyol compound (A) consists of (A1) the phosphorus-containing polyol with a phosphorus atom and (A2) a phosphorus-free polyol without a phosphorus atom.

15 4. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, characterized in that at least one phosphorus-containing polyol (A1) is a phosphoric polyol represented by the following general formula (1) or (2):



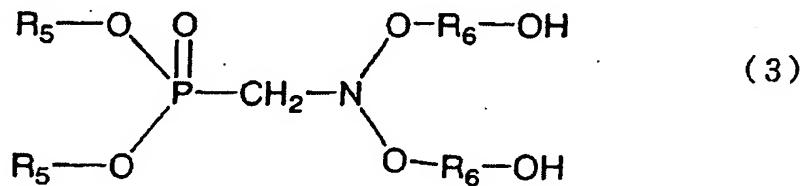
where each R_1 is independently hydrogen, C_{1-18} alkyl or C_6 -aryl, and R_2 is a group selected from the group consisting of polyhydroxyalkyl, polyhydroxyaryl, polyhydroxyalkylaminoalkyl, polyhydroxyarylaminoalkyl, polyhydroxyalkylaminoaryl and polyhydroxyarylaminoaryl.



where each R_3 is independently a group selected from the

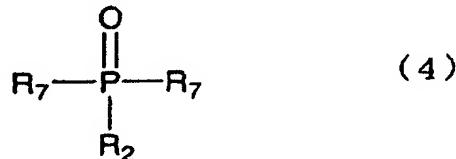
group consisting of C_{1-18} alkyl, C_{6-20} aryl, poly(alkyleneoxide) polyhydroxyalkyl, polyhydroxyaryl, polyhydroxyalkylaminoalkyl, polyhydroxyarylaminolalkyl, polyhydroxyalkylaminoaryl and polyhydroxyarylaminaryl, with the proviso that at least one R_3 contains a polyhydroxy group; each R_4 is independently a group selected from the group consisting of C_{1-18} alkylene and C_{6-20} arylene; and m and n are each independently an integer of 0-1000, provided that at least one of m and n is 1 or greater.

5 5. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, characterized in that at least one phosphorus-containing 10 polyol (A1) is an aminophosphonate polyol represented by 15 the following general formula (3).



20 where each R_5 independently represents C_{1-18} alkyl or C_{6-20} aryl, alkylaryl or arylalkyl, which groups may have ether bonds or ester bonds and may contain hydroxyl groups; and each R_6 independently represents C_{1-18} alkylene, which groups may have ether bonds or ester bonds and may contain hydroxyl groups.

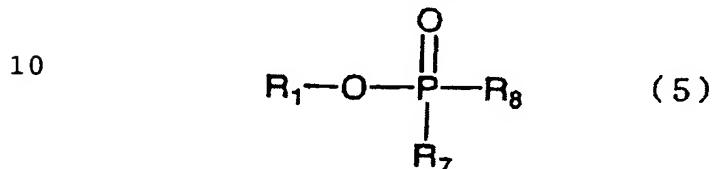
25 6. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, characterized in that at least one phosphorus-containing 30 polyol (A1) is a phosphine compound represented by the following general formula (4).



35 where R_2 is a group selected from the group consisting of polyhydroxyalkyl, polyhydroxyaryl,

polyhydroxyalkylaminoalkyl, polyhydroxyarylaminolalkyl, polyhydroxyalkylaminoaryl and polyhydroxyarylaminolaryl, and each R, is independently C₁₋₁₈ alkyl or C₆₋₂₀ aryl.

7. The phosphorus-containing urethane
5 (meth)acrylate compound according to claim 1,
characterized in that at least one phosphorus-containing
polyol (A1) is a phosphinic acid compound represented by
the following general formula (5).



where R₁ is hydrogen, C₁₋₁₈ alkyl or C₆₋₂₀ aryl, R, is C₁₋₁₈ alkyl or C₆₋₂₀ aryl, and R₈ is a group selected from the
15 group consisting of polyhydroxyalkyl, polyhydroxyaryl,
polyhydroxyalkylaminoalkyl, polyhydroxyarylaminolalkyl,
polyhydroxyalkylaminoaryl, polyhydroxyarylaminolaryl,
polyhydroxyalkyloxycarbonylalkyl,
polyhydroxyalkyloxycarbonylaryl, polyhydroxyaryloxy-
20 carbonylalkyl and polyhydroxyaryloxy carbonylaryl.

8. The phosphorus-containing urethane
(meth)acrylate compound according to claim 1,
characterized in that the proportion of the phosphorus-
25 containing polyol (A1) in the polyol compound (A) which
comprises the phosphorus-containing polyol (A1) and the
phosphorus-free polyol (A2), is 30-100 wt% with respect
to the total of the polyol compound (A).

9. The phosphorus-containing urethane
(meth)acrylate compound according to claim 1,
30 characterized in that the phosphorus content of the
phosphorus-containing polyol (A1) is 5 wt% or greater.

10. The phosphorus-containing urethane
(meth)acrylate compound according to claim 1,
characterized in that the polyol compound (A) includes a
35 carboxyl group-containing polyol having one or more
carboxyl groups and two or more alcoholic hydroxyl
groups.

11. The phosphorus-containing urethane
(meth)acrylate compound according to claim 10,
characterized in that the carboxyl group-containing
polyol is at least one branched or linear
dihydroxyalkanoic polycarboxylic acid selected from the
group consisting of dimethylolpropionic acid and
dimethylolbutanoic acid.

12. The phosphorus-containing urethane
(meth)acrylate compound according to claim 1,
10 characterized in that the polyol compound (A) includes at
least one selected from the group consisting of polyether
polyols, polyester polyols, polylactone-based polyols and
polycarbonate polyols.

13. The phosphorus-containing urethane
15 (meth)acrylate compound according to claim 1,
characterized in that the polyol compound (A) contains a
C₂₋₁₀ glycol.

14. The phosphorus-containing urethane
(meth)acrylate compound according to claim 1,
characterized in that the bifunctional or greater
polyisocyanate (B) is at least one selected from the
group consisting of 2,4-toluene diisocyanate, 2,6-toluene
diisocyanate, isophorone diisocyanate, hexamethylene
diisocyanate, diphenylmethylen diisocyanate, (o, m or
p)-xylene diisocyanate, methylenebis (cyclohexyl
isocyanate), trimethylhexamethylene diisocyanate,
cyclohexane-1,3-dimethylene diisocyanate, cyclohexane-
1,4-dimethylene diisocyanate and 1,5-naphthalene
diisocyanate.

30 15. The phosphorus-containing urethane
(meth)acrylate compound according to claim 1,
characterized in that the hydroxyl group-containing
(meth)acrylate (C) is at least one selected from the
group consisting of 2-hydroxyethyl (meth)acrylate,
hydroxypropyl (meth)acrylate, hydroxybutyl
(meth)acrylate, caprolactone or alkylene oxide adducts of
any of the above acrylates, glycerin mono(meth)acrylate,

glycerin di(meth)acrylate, glycidyl methacrylate-acrylic acid adduct, trimethylolpropane mono(meth)acrylate, trimethylol di(meth)acrylate, pentaerythritol tri(meth)acrylate, dipentaerythritol penta(meth)acrylate, 5 ditrimethylolpropane tri(meth)acrylate and trimethylolpropane-alkylene oxide adduct-di(meth)acrylate.

16. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, 10 characterized in that the acid value of the solid portion is 5-150 mgKOH/g.

17. The phosphorus-containing urethane (meth)acrylate compound according to claim 1, characterized in that the weight-average molecular weight 15 is 1,000-40,000.

18. A process for producing a phosphorus-containing urethane (meth)acrylate compound characterized by comprising polyaddition reaction of (A) a polyol compound comprising (A1) a phosphorus-containing polyol with (B) a bifunctional or greater polyisocyanate to form a urethane oligomer with isocyanate groups at both ends; and addition polymerization of (C) a hydroxyl group-containing (meth)acrylate to said urethane oligomer.

19. The process for production of a phosphorus-containing urethane (meth)acrylate compound according to claim 18, characterized in that the polyol compound (A) includes a carboxyl group-containing polyol having one or more carboxyl groups and two or more alcoholic hydroxyl groups.

20. The process for production of a phosphorus-containing urethane (meth)acrylate compound according to claim 18, characterized in that the polyol compound (A) includes at least one selected from the group consisting of polyether polyols, polyester polyols, polylactone-based polyols and polycarbonate polyols.

21. A photosensitive composition comprising the phosphorus-containing urethane (meth)acrylate compound

according to any one of claims 1 to 17.

22. The photosensitive composition according to claim 21, characterized by comprising a phosphorus-free urethane (meth)acrylate compound obtained by reacting
5 (A2) a phosphorus-free polyol having no phosphorus atoms, (B) a bifunctional or greater polyisocyanate and (C) a hydroxyl group-containing (meth)acrylate.

10 23. The photosensitive composition according to claim 21, characterized by comprising a photopolymerizing monomer and/or a photopolymerizing oligomer.

15 24. The photosensitive composition according to claim 21 which contains a photopolymerization initiator in a range of 0.2-20 parts by weight to 100 parts by weight of the photocuring component.

20 25. The photosensitive composition according to claim 21, characterized by containing a thermosetting resin in a range of 5-40 wt% of the total photosensitive composition.

25 26. The photosensitive composition according to claim 21, characterized in that the proportion of the phosphorus-free urethane (meth)acrylate compound is in a range of 0-70 wt% with respect to the total of the urethane (meth)acrylate compound.

30 27. The photosensitive composition according to claim 21, characterized in that the amount of the phosphorus-containing urethane (meth)acrylate compound is in a range of 10-90 wt% of the total photosensitive composition.

28. A cured photosensitive composition according to claim 21.

29. A cured photosensitive composition according to any one of claims 22 to 27.

35 30. A overlay film for a printed wiring board employing the composition comprising a phosphorus-containing urethane (meth)acrylate compound according to any one of claims 1 to 17.

31. A solder resist for a printed wiring board

employing the composition comprising a phosphorus-containing urethane (meth)acrylate compound according to any one of claims 1 to 17.